Color, in spirits, dusky olive, without cross-bands or scapular spot; centers of scales paler, thus forming faint longitudinal streaks; many scales of back and sides, each with a dark brown spot; these irregularly scattered. Body and head soiled with dark points. Dorsal, anal and caudal conspicuously marked with cross-bars formed of dark dots; ventrals and anal largely dusky, similarly but more faintly barred.

The discovery of a second species of this remarkable genus is very interesting.

15. **Pœcilichthys barratti**, (Holbrook). 25343. I. R.

16. **Lepidogobius gulosus**, (Girard). 25335. I. R.

Largest specimen $3\frac{1}{2}$ inches long. These are larger than the specimens described by us (Proc. U. S. Nat. Mus., 1882, 294), from Pensacola. They are duller in color than the latter. The largest ones have the maxillary extending far beyond the eye, its length $1\frac{3}{5}$ in head, and the dorsal spines filamentous, reaching middle of soft dorsal. The smaller ones have the dorsal spines low and the mouth much smaller.

17. **Gobiosoma bosci**, Lac. 25314. I. R.

SMITHSONIAN INSTITUTION, *August* 5, 1884.

CONCERNING SOME OF THE FORMS ASSUMED BY THE PATELLA IN BIRDS.

By DR. R. W. SHUFELDT, U. S. A.

Vicq-d'Azyr saw in the patella a detached olecranon—the homotype of the extensive process, so named—which is found at the proximal extremity of the ulna in the human subject, as it is in many other vertebrates. But what would this time-honored anatomist have to say for himself were he now standing at my side, and his opinion asked as to the nature of the bones of the limb which I have in my hand? It is the complete skeleton of the right lower extremity of *Centrocercus*, taken from a bird of this species less than half grown. Several years ago I figured these very bones, and they may be seen in my Osteology of the Tetraonidæ, plate ix, figure 67. In this limb neither the patella nor the calcaneal sesamoid has yet ossified, owing to the fact that the bird from which it was taken had not sufficiently advanced in age for this condition to have come about. In the memoir in question a large epiphysis was described as occupying the site of the future cnemial crest of the tibia, which part of the bone never becomes a very prominent feature in this bird even after it has become full grown. There seems to be no particular necessity for this accretion to ossify thus separately from the end of the tibia, yet it is found to be quite formidable in size, and as the fowl grows cartilaginous ridges that eventually become the pro- and ectocnemial processes of the tibia are seen upon its anterior face. In

mature birds its amalgamation with the leg-bone is complete, and not a trace of its original existence remains. As it seems to be superadded to the center which forms for the end of the shaft—an ossification found pretty generally among all vertebrates with well-developed limbs—I take it to be the homotype of the olecranon, and believe that Vicq-d'Azyr and his adherents on the patella question could soon be led to a similar conviction. This would be the more likely, as this old-time anatomist, to whom we have referred it, would quickly discover that we largely sided with him in a matter that still furnishes food for argument in present times. I refer to the mooted point of the antitypes of the bones of the extremities. Much has been written upon this subject; it has been well treated by Wyman in his paper "On the Symmetry and Homology in Limbs" published in 1867. Three years later Prof. Elliott Coues ably handled the question of "Antero-posterior symmetry, &c.," in a series of articles which appeared in the New York Medical Record in 1870. Here I think the difference between what is meant by homotypy, or serial homology, and antitypy is most satisfactorily explained. Entirely opposite views in the premises are entertained by Huxley and Flower, while those anatomists nearly agreeing with the last-named were defended by Owen, thirty-four years ago, in his work "On the Nature of Limbs." The scope of this paper will not allow me more than a simple expression of opinion, and this is to the effect that I take the tibia to be the antitype of the ulna, as the fibula is of the radius. There is no doubt about femur and humerus. It is almost unnecessary to add, after what has been said above, that I regard the patella as a sesamoid, and see the homotype of the olecranon in the tuberosity of the tibia of the posterior extremity.

Now, the patella in birds offers us some very interesting and varied forms, notwithstanding the fact that anatomists often complain of the lack of striking differences in the skeletons of this class. No doubt there is much truth in all this, still we find marked departures from a common type, when we come to group and exhibit together characters from widely separated forms.

Quite recently I had the pleasure of examining the leg-bones and patella of the type specimen of *Aptenodytes pennantii* used by Coues in his paper on "Material for a Monograph of the Spheniscidæ." (Proc. Acad. Nat. Sci. Phila., xxiv, 1872.) I give you a life-size drawing of these bones from the right limb of this Penguin, showing the great quadrate patella slightly raised above its articulation with the tibia. In the same cut, A and B, are copies of different views of the patella of *Eudyptes chrysocome*, by Morrison Watson (Report on the *Spheniscidæ;* Rep. Scien. Results of Exp. Voyage of H. M. S. Challenger, Vol. vii, Pl. vii, Figs. 9 and 10, Zoology, 1883). In the magnificent work I refer to, Watson tells us that "the patella is of exceptionally large size, and presents a somewhat peculiar form in the Penguins. In form it

resembles a wedge, the anterior or sharp margin of which is directed forwards, the base backwards towards the femur. The base of the wedge is broad, deeply concave, and adapted to the pulley-like surface of the lower end of the femur. The outer surface of the bone is for the most part smooth, but presents about its middle a deep and narrow groove, which, commencing in front at the middle of the anterior border of the bone, passes obliquely backwards, downwards, and outwards across the external surface. This groove accommodates the tendon of the "ambiens" muscle. The inner surface of the bone is smooth. The upper end of the patella is obliquely truncated, and affords insertion to the muscular fibers of the extensor cruris muscle, while the lower end, narrower and more irregular in form, is attached by means of very short ligamentous fibers to the anterior border of the upper end of the tibia. The patella presents essentially the same characters in every species." This description answers very well for *Aptenodytes*, only this latter Penguin has the patella much larger, as will be seen in the figure. In the great majority of birds where a patella exists it is found to have the form of an oblate hemispheroid, with its base directed upwards for insertion of the extensor cruris. A very good example of this is seen in our common eastern crow (Fig. 2), and it is this bird I have chosen to illustrate this style of patella in the figure (C). We find it associated in the cut with two other rather extraordinary patellæ, that of *Mergus serrator* (D), and *Sula bassana* (E). The bone in the double patella of *Mergus* is of a very elementary character, indeed almost cartilaginous in appearance and consistence. This bird, we see, approaches very near not having any patella at all. The best example I have of this condition is seen in two specimens of *Hæmatopus niger* from the collections at the Smithsonian Institution. Here, in these birds, I fail to find the slightest trace of this sesamoid.

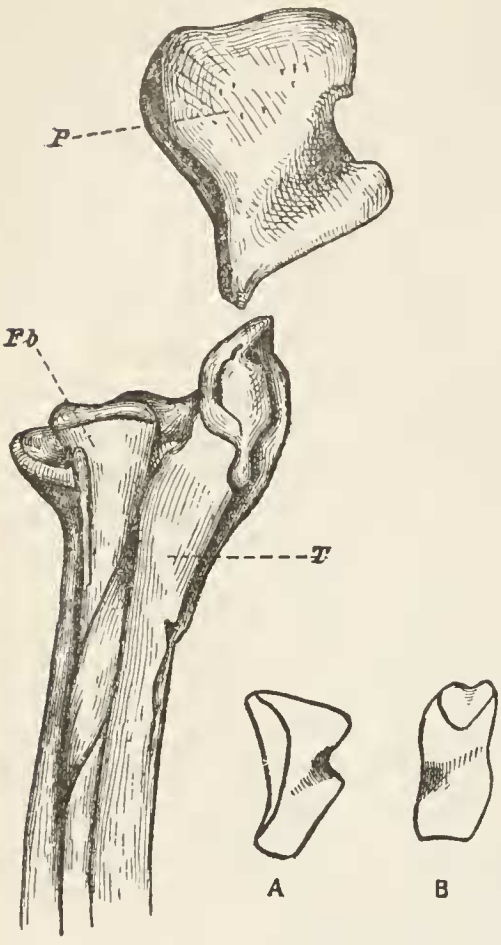

FIG. 1.—Leg-bones and patella, right limb, of *Aptenodytes pennantii*; life-size from nature. T, tibia; F, fibula; P, patella; the last slightly raised above its articulation with tibia. (No. 11976, Smithsonian Collection.) By the author. A, patella of *Eudyptes chrysocome* (from Triston d'Acuha) outer surface, natural size. B, the same seen from in front (after Watson).

Professor Marsh tells us that the patella of *Sula* is perforated by a large foramen for the passage of the tendon of the ambiens muscle, agreeing in this respect with the fossil bird *Hesperornis* (Ordontorni-

thes, page 93). I fail to find any such foramen in the patella of the specimen of *Sula* before me, although it has a shallow, oblique groove across its anterior face that seems to correspond with the one described when speaking of the patella of the Penguin. One of the most interesting and at the same time one of the most familiar to us is the arrangement of these bones in some of the divers. To illustrate the condition of things as they are in these birds, I have chosen and drawn the

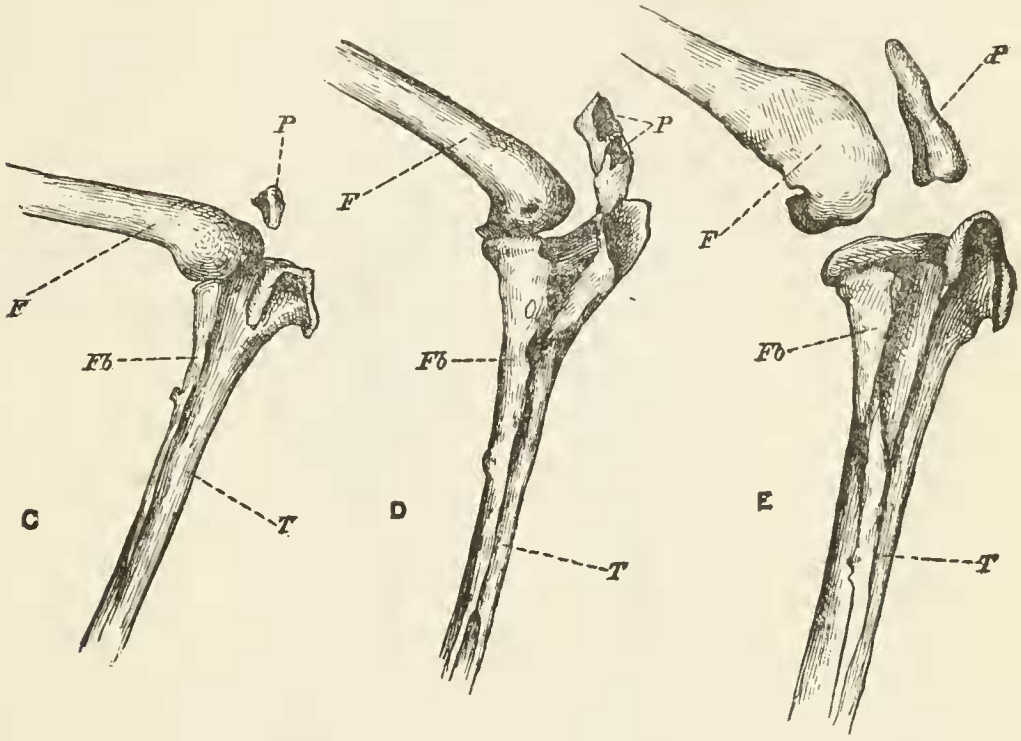

FIG. 2.—C. Femur and leg-bones of *Corvus americanus* showing the patella slightly in advance of its normal position. (No. 133, Collection in Army Medical Museum.) D. The same bones from *Mergus serrator*, showing the two elementary patellæ surrounded by ligament and about in their normal position. (No. 16626, Smithsonian Collection.) E. Same bones from *Sula bassana*, with femur and patella thrown somewhat out of their normal position. (No. 16643, Smithsonian Collection.) All the figures are life-size, chosen from the right limb, and F signifies femur; T, tibia; Fb, fibula, and P, patella throughout. Drawings by the author.

bones of the leg in *Pordieps cornutum* (Fig. 3), giving two different views. Probably no better example exists in all nature showing the coexistence of a patella with a prolonged cnemial crest of the tibia than we fine in *Podiceps*. When in position it is closely applied by its anterior surface to the posterior surface of the greatly produced rotular process already alluded to, extending somewhat above it, which extension in some specimens is bent slightly forward.

This strongly suggests the idea that the olecranon of the ulna can in noways be considered as being homologous with the patella, but only with the rotular process of the tibia; indeed, in each case I must agree with Coues in this matter, and regard these processes as mere extensions of the shaft of the bones in question. (The Medical Record, 1870, p. 194.) In the case of *Colymbus* a positive requirement is met, and that is to afford additional surface for the insertion of the extensores cruris, as well as affording greater leverage in the play of the limb.

The relative proportions of these structures, however, differ very much in *Podiceps* and *Colymbus*. The patella in *Podiceps* probably contains actually more bone, that is to say, it is larger than the rotular process of the tibia; whereas in *Colymbus*, the rotular process of the

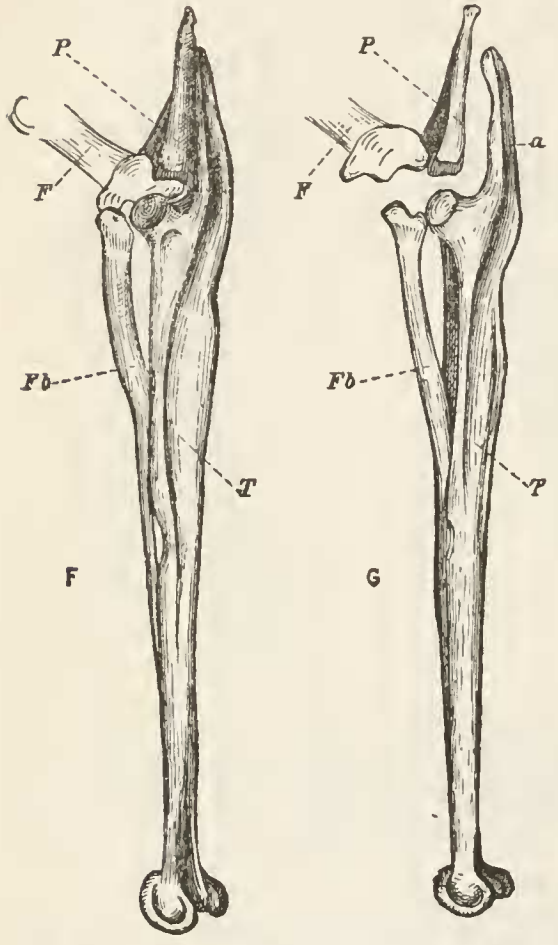

FIG. 3.—Leg-bones and patella from *Podiceps cornutum*. F, the limb rotated slightly outwards. G, a square lateral view. In the first the bones are *in situ*; in the second, femur and patella thrown backwards out of position. Lettering as before, with *a* rotular crest of tibia. No. 1120, Army Med. Mus., life size. Drawn by the author from the specimen.

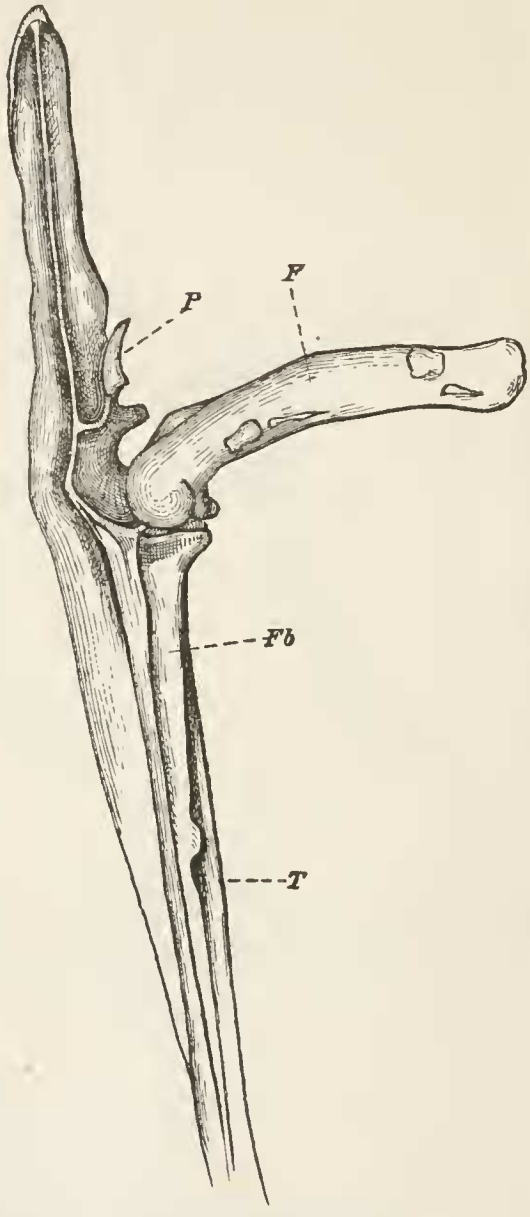

FIG. 4.—*Colymbus septentrionalis*; life size; lettering as in former figures. (Spec. 16628 Smithsonian collection.) By the author.

tibia is a very extensive prolongation upwards of the shaft, while the patella is reduced to a diminutive flake of bone, articulating above the base on its posterior aspect. This is well shown in my drawing of these parts, taken from a specimen of *Colymbus septentrionalis* (Fig. 4).

The Loon, as another representative of the same genus, shows a like condition or arrangement of the structures involved, and we are all familiar with the illustration, now so long on duty, given us by Professor Owen in the second volume of his Anatomy and Physiology of Vertebrates. In passing it may be as well to call attention to the fact,

already noted by the author just referred to, that the great pro- and ecto-cnemial ridges we observe on the anterior aspect of the rotular crest, and continued down the shaft of the tibia, may be present and highly developed without an extension of that crest above the proximal surface of the bone. A beautiful example of this I quite recently saw upon an exceptionally fine specimen of the fossil *Cnemiornis*, received a few weeks ago at the Smithsonian Institution. A bird that affords another very interesting condition of these parts, having a very small patella and a large procnemial process, though differing very much from

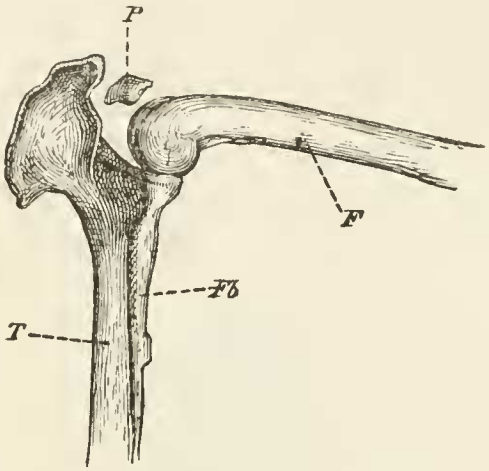

FIG. 5.—*Fulmarus rodgersii*, nat. size; lettering the same. (No. 12612 Smithsonian collection). Showing the patella P in its normal position in this bird. By the author.

Colymbus, is *Fulmarus rodgersii*, a good skeleton of which I find in the collection brought from Alaska by Mr. H. W. Elliott. After what has been written, no special description will be necessary of the drawing here presented, showing these bones in Rogers' Fulmar. Some of the great

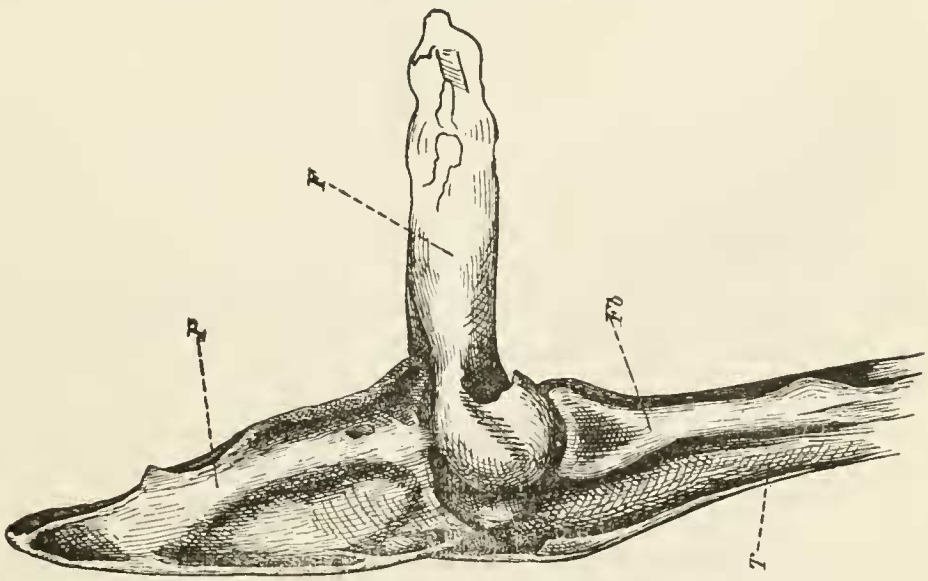

FIG. 6.—*Hesperornis regalis*. ½ nat. size. Letters as before. (After Marsh.)

extinct divers found in the Cretaceous beds of this country had a very big patella. For example, we find "the patella in *Hesperornis regalis* is a large bone, and entirely distinct from the tibia. In its general propor-

tions it resembles the patella in *Podiceps*. It differs materially, however, in being perforated by a large foramen for the tendon of the *ambicus* muscle, agreeing in this respect with the patella of the Gannet (*Sula bassana*, Briss.). The patella is much compressed transversely. Seen from side to side it is triangular in outline, and the outer surface is concave. When in position, its longer axis was nearly parallel with the axis of the tibia. Its lower extremity bears a large twisted articular face for the union with the femur, and the lower posterior half of the inner side is toughened for attachment to the cnemial spine. The position of the patella in the skeleton is shown in Plate XX. When at rest, it extended in front of the anterior margin of the ilium, and, by its muscular attachments, added greatly to the power of the posterior limbs in swimming. The superior extremity is obtusely pointed, and the outer margin is arcuate." (Marsh, Odontornithes, p. 93.)

In No. 41 of Science, I presented a lateral view of the leg-bones of a Cormorant (*Phalacrocorax*), showing the form of the patella in these

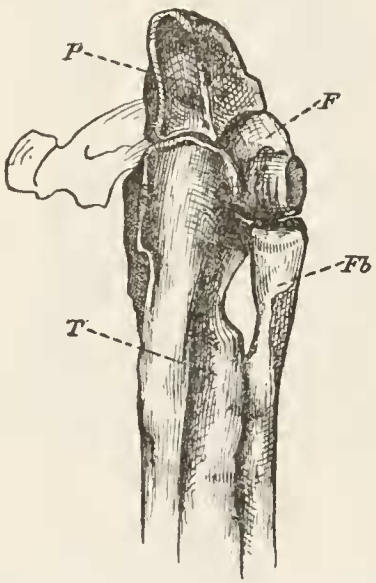

FIG. 7.—*Phalacrocorax bicristatus*, seen from in front. Life size. Letters signify the same as in the other illustrations. By the author.

birds. The same specimen is given here; only an anterior view is chosen instead of the lateral one.

This form is a particularly interesting one, and I am not aware of any bird at present that can show a similar condition of the parts in question.

On the face of it, it almost looks as if a patella had developed of a size equal to the rotular process, and subsequently the two became thoroughly united, and formed one large patella, articulating as shown in the drawings I have made of it. I do not say that this is actually the case, nor were the young of this specimen, which also belong to the collections at the Smithsonian Institution, of a proper age to determine exactly the manner in which this great bulky patella was developed.

Some of the problems that are presented in the evolution of this sesamoid no doubt will be found to be very interesting and instructive.

Now, why is it that in three such forms as *Podiceps*, *Colymbus*, and *Hesperornis*, all undoubtedly powerful divers, in the first we should have retained a patella fully as large as the extensive rotular process; that in the second it has been reduced to a mere flake of bone and an immense rotular process retained; and finally, in their ancient ancestor we again find an enormously developed patella with a very considerable process on the tibia?

Such questions will probably only be arrived at, if they are ever answered at all, by the most searching investigations into the anatomy, and more particularly the physiology, in such instances as these, of living birds. Palæontology in such matters simply offers us the nuts to crack, as of course every vestige of the muscular system has disappeared in our fossil birds.

OBSERVATIONS UPON A COLLECTION OF INSECTS MADE IN THE VICINITY OF NEW ORLEANS, LOUISIANA, DURING THE YEARS 1882 AND 1883.

By DR. R. W. SHUFELDT, U. S. A.

While stationed in New Orleans during the autumn of 1882 and spring and the greater part of the summer of the ensuing year, all the time that could possibly be spared from other duties I devoted to making a collection of the vertebrates and invertebrates of the region. This collection when brought all together consisted of some 2,500 to 3,000 specimens; circumstances existed, however, that prevented me from bestowing the attention upon it that it deserved, or systematically disposing of the material so hurriedly brought together.

The major part of the insects that were taken were sent unassorted in alcohol to the Agricultural Department of Washington. They numbered some five or six hundred, and were collected during the times specified over a limited tract of country lying south of, and just beyond, the city limits.

Through the kindness of Prof. C. V. Riley, I am enabled to present a tolerably complete list of these insects. All of the diagnoses were made under the direction of this gentleman, and I am further under great obligations to him for the interest he has taken in the matter, and other assistance so cheerfully given in connection with the collection.

The first installment was forwarded on the 27th of November, 1882, the specimens in it having been captured between the middle of the preceding month and that time.

On the 5th of December I received from Professor Riley the following determinations of this part of the collection:

I. Coleoptera.

Laxandrus rectangulus Lec. 1 specimen.
Diplochila laticollis Lec. 1 specimen.